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(54) AQUEOUS, SOAP-BASED LIQUID DETERGENT COMPOSITION

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AQUEOUS, SOAP-BASED LIQUID DETERGENT COMPOSITION

The present invention relates to an aqueous liquid detergent composition, in which the detergent-active material is or comprises a soap.

Soap-based liquid detergent compositions are well-known in the art. Because of the water-solubility limits of the commonly-known soaps, such soap-based liquids contain either a relatively low concentration of soap, when soap is the sole detergent-active material in these liquids, or they contain, next to the soap, another synthetic detergent-active material, by the presence whereof the concentration of soap in the liquid can be made higher.

Soap-based liquid detergent compositions often suffer from physical drawbacks; thus, for example, it is a problem to prepare a liquid composition which is physically stable, has a satisfactory pourability or viscosity, or which does not gel. Overcoming these problems often creates another one, i.e. that in doing so the washing and laundering efficacy of the composition is impaired.

Hence it is an object of the present invention to provide an aqueous, soap-based liquid detergent composition which is physically stable, has satisfactory pourability or viscosity characteristics, which does not gel and which has a satisfactory washing, laundering, and cleaning performance.

It is another object of the present invention to provide for such an aqueous, soap-based liquid detergent composition which has a satisfactory washing and laundering performance over a broad temperature range, i.e. at low, medium and high washing or laundering temperatures.

These and other objects of the invention have been found to be met by using in the soap component a sodium soap of linoleic acid. It has been found that if the soap component contains a sodium

linoleate (a further definition of the soap component will follow below), the liquid detergent composition has a satisfactory detergency over a broad temperature range and can contain a relatively high concentration of soap. The detergency efficacy is less impaired by the water hardness than with soap systems not containing the linoleate.

As stated above, it is an essential feature that in the soap component a sodium linoleate is used. The soap component may consist solely of sodium linoleate, which may in practice, however, meet with cost and availability problems. Therefore - and this is a preferred embodiment of the invention - it has been found that if the soap component, next to the sodium linoleate, also contains a sodium soap of a C_{16}-C_{24} mono-unsaturated fatty acid, the same benefits are obtained to practically the same degree. Thus, it has been found that if the soap component contains a mixture of sodium linoleate and sodium oleate, in such a relative weight proportion that at least 10% by weight of the sum of these two soaps consists of sodium linoleate, quite satisfactory liquid products are obtained, particularly as regards its detergency over a broad temperature range. Such mixtures can e.g. be obtained from the soapstock fatty acids, obtained from refining and margarine industries. Instead of, or in addition to sodium oleate, a sodium soap of palmitoleic, petroselinic, vaccenic, gadoleic, eicosenoic, cetoleic, erucic and selacholeic acid can also be used.

The soap component may consist solely of the mixture of sodium linoleate and sodium oleate, but it has been found that certain amounts of certain saturated fatty acid sodium soaps can be tolerated without significantly impairing the benefits of the present invention. Thus it has been found that the soap component may contain up to 20% by weight of a saturated C_{16}-C_{24} fatty acid soap. However, this saturated fatty acid soap may not be a sodium laurate or sodium myristate, since the presence thereof significantly detracts from the benefits of the present invention. Small amounts, i.e. up to 5, preferably 3%, can be tolerable, provided there is sufficient linoleate or linoleate plus oleate present, but it is highly preferred that no sodium laurate or

sodium myristate is present in the soap component. Typical examples of sodium soaps of saturated C_{16} and high fatty acids are sodium palmitate, sodium margarate, sodium stearate, sodium nonadecylate, sodium arachidate, sodium heneicosinate, sodium behenate, sodium tricosanate, sodium lignocerate, and sodium soaps of trans-fatty acids of hardened oils and fats.

Mixtures of the above-identified soaps, i.e. sodium linoleate plus sodium oleate plus up to 20% of a soap of a saturated C_{16}-C_{24} fatty acid can be obtained from the separate fatty acids, but may also be obtained from suitable sources which contain these fatty acids in the appropriate proportions. Such sources are grapeseed oil, chufa oil, groundnut oil, maize oil, mustard seed oil, soybean oil, sesame oil, sunflower oil, cottonseed oil, rapeseed oil and tall oil fatty acids. Of these, the last-mentioned five oils and the tall oil fatty acids are preferred. The sodium soaps may be prepared by neutralizing the fatty acids, obtained from these sources and this is preferred when tall oil fatty acids are used.

In the case of the other suitable oils, however, it has been found that the sodium soap can also be prepared in a practical and advantageous manner by carrying out saponification of the oil in the presence of suitable emulsifying agents and neutralization of the fatty acids in situ in the liquid detergent composition. In this manner, an easy way of preparing the compositions of the invention is provided, leading to physically stable products.

It is essential in this process that an emulsifying agent is present in the liquid in which the saponification takes place. Such emulsifying agents are e.g. nonionic detergent surfactants like the ethoxylation and/or propoxylation products of linear or branched-chain primary or secondary, natural or synthetic alcohols having 8-24 carbon atoms in their alkyl chain, of mono- or dialkylphenols having from 8-18 carbon atoms in thier alkyl chain, of C_8-C_{22} fatty acids, of polyethylene- or polypropylene-glycols, of C_8-C_{22} fatty amines, -amides or -alkylolamides and so on. Tertiary amine oxides having one C_8-C_{18} alkyl chain and two C_1-C_5 alkyl chains are also included in the term nonionic detergent. Amphoteric and zwitterionic detergents may also be used, such as sulphobetaines, amido-betaines,

alkylaminocarboxylic acids etc.

The amount of such emulsifying agent is not critical; in fact it is often desirable to add more than is necessary for the saponification, i.e. in the cases where the presence of a nonionic detergent in the compositions of the invention is required for further improved washing and laundering efficacy, e.g. in underbuilt situations as well as physical stability. In general therefore the compositions of the invention contain from 0-40% by weight of a nonionic detergent material (0% only in the case where the sodium linoleate or sodium linoleate/sodium oleate constitutes the whole of the soap component, and is not prepared by in situ saponification and neutralization) and preferably from 5-30% of a nonionic detergent material is present.

The amount of the soap component in the liquid composition is generally from 2.5-40, preferably 5-35% by weight.

The compositions of the invention may furthermore contain hydrotropes, buffers, fluorescers, soil-suspending agents, enzymes, stabilizers for enzymes, dyes, perfumes, anti-oxidants and so on, all in amounts usually encountered in products of this type. Sequestrant builders can also be included in an amount of up to 20% by weight.

The invention, as well as its benefits, will further be illustrated by the following Examples.

Example 1

The following liquid detergent compositions were formulated

	% by weight	
Tall oil fatty acids	25	30
C_{12}-C_{13} p-alcohol, condensed with 6.5 moles of ethylene oxide	25	10
NaOH (33% aqueous solution)	15	18
triethanolamine	10	10
isopropyl alcohol	10	10
enzyme (Alcalase ®)	0.3	0.3
dye and perfume	0.25	0.25
boric acid	2	2
water	balance	balance

These liquid compositions were stable: they remained homogeneous after the two weeks' storage at 0°C.

Example 2

In the formulations of Example 1, the tall oil fatty acids were replaced by fatty acids, derived from soybean-, sunflower-, rapeseed- and cottonseed oil, and mixtures thereof. This was done in the following way: the mixture of the lye, the triethanolamine, the nonionic detergent and water was heated till 80°C, after which the oil was added. Subsequently, after cooling till 60°C, the isopropyl alcohol was added, and subsequently, after further cooling, the enzyme and the other ingredients.
Similar formulations were prepared in the same manner, with varying amounts of soap and nonionic detergent. These formulations were stored for 2 weeks at 0°C, and their phase stability was assessed.

The following results were obtained:

With soybean oil fatty acids: the liquids were stable at the 10% soap level in the whole range of 10-25% of the nonionic detergent. With sunflower oil fatty acids: the liquids were stable at a 10 and 15% soap level in the whole range of 10-25% nonionic detergent, and also at the 20% soap level with 15% nonionic detergent.

With rapeseed oil fatty acids, the liquids were all stable in the whole soap range of 10-25% and in the whole nonionic detergent range of 10-25%. With cottonseed oil fatty acids, stability was obtained at the 10% soap level in the nonionic range of 10-25%, as well as at the 15% soap level and 15% nonionic level. Mixtures of soybean- and rapeseed oil fatty acids (ratio of 1 to 1) gave products, which were stable at nearly all soap and nonionic levels within the 10-25% range.

Example 3

Using coconut dimethyl amine oxide (5%) in the formulation of Example 1 as the nonionic with 5, 10, 15 and 20% sodium soap of soybean oil fatty acids (saponified and neutralized in situ)

gave stable products.

Example 4

The following liquid compositions C and D were assessed for detergency in a Tergotometer at 60°C, 15 minutes washing, hardness 26° French hardness (only Ca^{2+}) at a dosage of 8, 9.5 and 11 g/l. Three types of soiled standard test pieces (WFK, ERTC and VCD) were used, and the number of repeats was 8.

The compositions were as follows:

	% by weight	
	C	D
sodium oleate	12.5	12.5
sodium linoleate	12.5	-
sodium coconut soap	-	12.5
triethanolamine	10.0	10.0
isopropylalcohol	10.0	10.0
water	balance	balance

The following differences in reflectance (ΔR) were measured:

Test piece	concentr. / composition	8	9.5	11
WFK	D	5.0	6.9	11.9
	C	7.2	10.3	14.7
ERTC	D	3.3	11.1	22.7
	C	2.9	19.5	22.7
VCD	D	3.3	13.4	16.9
	C	4.6	16.7	18.5

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An aqueous soap-based liquid detergent composition comprising from 2.5-40 % by weight of the composition of soap component which comprises a) from 10-100 % by weight of sodiumlinoleate, b) from 0-90 % by weight of a sodium salt of a C_{16}-C_{14} mono-unsaturated fatty acid, c) from 0-20 % by weight of a sodium salt of a saturated C_{16}-C_{24} fatty acid and d) from 0-5 % by weight of sodiumlaurate or sodiummyristate, the sum of the weight percentages of a), b), c) and d) being 100 % by weight of the soap component, the balance of the composition consisting of an aqueous medium which comprises from 0-40 % by weight of the composition of a nonionic detergent and from 0-20 % by weight of the composition of a sequestrant builder.

2. A process for the preparation of an aqueous soap-based liquid detergent composition comprising from 2.5-40 % by weight of the composition of soap component which comprises a) from 10-100 % by weight of sodiumlinoleate, b) from 0-90 % by weight of a sodium salt of a C_{16}-C_{14} mono-unsaturated fatty acid, c) from 0-20 % by weight of a sodium salt of a saturated C_{16}-C_{24} fatty acid and d) from 0-5 % by weight of sodiumlaurate or sodiummyristate, the sum of the weight percentages of a), b), c) and d) being 100 % by weight of the soap component, the balance of the composition consisting of an aqueous medium which comprises from 0-40 % by weight of the composition of a nonionic detergent and from 0-20 % by weight of the composition of a sequestrant builder in which the soap component is prepared from oils, the fatty acids of which correspond with those of the soap component, by means of saponification of these oils in the presence of a nonionic emulsifying agent and neutralisation of the resulting fatty acids in situ to the sodium salts in the liquid detergent composition.

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